WE CLAIM:

1. A piston ring comprising:

a top surface separated from a bottom surface by a height;

an inside surface connecting said top surface to said bottom surface;

an outside surface connecting said top surface to said bottom surface;

said inside surface being separated from said outside surface by a thickness;

a gap extending completely through said ring from said top surface to said bottom surface and from said outside surface to said inside surface when said piston ring is on a piston;

said gap characterized by a gap width that is about 1.4 to about 2.0 times greater than said thickness.

2. The piston ring of claim 1, wherein said piston ring is formed of a material comprising cobalt, chromium, tungsten, and carbon.

3. The piston ring of claim 2, wherein said material comprises about 64 wt% to about 68 wt% cobalt.

4. The piston ring of claim 3, wherein said material comprises about 26 wt% to about 30 wt% chromium.

5. The piston ring of claim 4, wherein said material comprises about 3.5 wt% to about 5.5 wt% tungsten.

6. The piston ring of claim 5, wherein said material comprises about 0.5 wt% to about 2 wt% carbon.

7. The piston ring of claim 6, wherein said material further comprises silicon, manganese, molybdenum, or a combination thereof.

8. The piston ring of claim 7, wherein said material comprises up to about 3 wt% nickel, up to about 3 wt% iron, or a combination thereof.

9. The piston ring of claim 1, wherein:

said top surface is disposed substantially perpendicular to said outside surface,

said top surface is connected to said outside surface through a leading edge, and

said leading edge is characterized by an arc having a radius of curvature less than or equal to about 4 times said height.

10. The piston ring of claim 9, wherein said radius of curvature is less than or equal to about 10 times said height.

11. The piston ring of claim 1, wherein said top surface is disposed substantially perpendicular to said outside surface,

said top surface is connected to said outside surface through a leading edge, and

said leading edge is characterized by an arc having a radius of curvature less than or equal to about 0.002 inches.

12. The piston ring of claim 11, wherein said radius of curvature is less than or equal to about 0.0005 inches.

13. The piston ring of claim 1, wherein said gap defines an opening having a gap width, wherein said gap extends radially along an imaginary line

equidistant from said inside surface.

14. The piston ring of claim 13, wherein said gap width is about 1.4 to about 2.0 times greater than said thickness.

15. The piston ring of claim 13, wherein said gap width is about 0.01 inches to about 0.02 inches.

16. The piston ring of claim 1, wherein said top surface, said bottom surface, or both, comprise a finish having a roughness of less than or equal to about 16 microinches.

17. The piston ring of claim 1, wherein said top surface, said bottom surface, or both, comprise a finish having a roughness of less than or equal to about 8 microinches.

18. The piston ring of claim 1, further comprising a plurality of recesses formed in said top surface, said inside surface, and said outside surface.

19. The piston ring of claim 18, further comprising a plurality of recesses formed in said bottom surface, said inside surface, and said outside surface.

20. The piston ring of claim 19, wherein said plurality of recesses are substantially equally spaced about a circumference of said piston ring.

21. The piston ring of claim 1, wherein said height is about 4.5 to about 6.4 times larger than said thickness.

22. The piston ring of claim 1, wherein said thickness is about 0.007 inches to about 0.01 inches.

23. The piston ring of claim 1 having a Rockwell C hardness of about 37 to about 43.

24. The piston ring of claim 1 having a ductility to allow said piston ring to be positioned within an annular recess in a periphery of said piston, without said piston ring becoming cracked, fractured, or bent into a second shape different from a first shape which characterized said piston ring prior to being positioned on said piston.

25. A piston ring comprising:

a top surface separated from a bottom surface by a height;

an inside surface connecting said top surface to said bottom surface;

an outside surface connecting said top surface to said bottom surface;

said inside surface being separated from said outside surface by a thickness, wherein said height is about 4.5 to about 6.4 times larger than said thickness;

a gap extending completely through said ring from said top surface to said bottom surface and from said outside surface to said inside surface when said ring is installed on a piston; and

said piston ring having a ductility to allow said piston ring to be positioned on said piston without said piston ring becoming cracked, fractured, or bent into a second shape different from a first shape which characterized said piston ring prior to being positioned on said piston.

26. The piston ring of claim 25, wherein said gap is characterized by a

gap width, wherein said gap extends radially along an imaginary line intersecting a center point of said piston ring, said center point being disposed equidistant from said inside surface.

27. The piston ring of claim 26, wherein said gap width is about 1.4 to about 2.0 times greater than said thickness when said piston ring is retained in an annular recess disposed in a periphery of a piston, and said piston ring is sealing fit in a cylinder.

28. The piston ring of claim 26, wherein said gap width is about 0.01 inches to about 0.02 inches.

29. The piston ring of claim 25, wherein said piston ring comprises cobalt, chromium, tungsten, and carbon.

30. The piston ring of claim 29, wherein said piston ring comprises about 64 wt% to about 68 wt% cobalt, about 26 wt% to about 30 wt% chromium, about 3.5 wt% to about 5.5 wt% tungsten, and about 0.5 wt% to about 2 wt% carbon.

31. The piston ring of claim 25, wherein:

said top surface is disposed substantially perpendicular to said outside surface,

said top surface is connected to said outside surface through a leading edge, and

said leading edge is characterized by an arc having a radius of curvature less than or equal to about 4 times said height.

32. The piston ring of claim 31, wherein said radius of curvature is less than or equal to about 10 times said height.

33. The piston ring of claim 25, wherein said top surface is disposed substantially perpendicular to said outside surface, wherein said top surface is connected to said outside surface through a leading edge, and wherein said leading edge is characterized by an arc having a radius of curvature less than or equal to about 0.002 inches.

34. The piston ring of claim 33, wherein said radius of curvature is less than or equal to about 0.0005 inches.

35. The piston ring of claim 25, wherein said top surface, said bottom surface, or both, comprise a finish having a roughness of less than or equal to about 16 microinches.

36. The piston ring of claim 25, wherein said top surface, said bottom surface, or both, comprise a finish having a roughness of less than or equal to about 8 microinches.

37. The piston ring of claim 25, further comprising a plurality of recesses formed in said top surface, said inside surface, and said outside surface.

38. The piston ring of claim 37, further comprising a plurality of recesses formed in said bottom surface, said inside surface, and said outside surface.

39. The piston ring of claim 25, wherein said thickness is about 0.007 inches to about 0.01 inches.

inches to about 0.01 inches.

40. The piston ring of claim 25 having a Rockwell C hardness of about 37 to about 43.

41. A gas compressor apparatus comprising:

a cylinder;

a piston reciprocally mounted within said cylinder;

a piston ring positioned about said piston, said piston ring having:

a gap that is characterized by a gap width that is about 1.4 to about 2.0 times greater than a thickness of said piston ring when said piston ring is installed on said piston; and

wherein a height of said piston ring is about 4.5 to about 6.4 times larger than said thickness.

42. A gas compressor apparatus comprising:

a cylinder;

a piston reciprocally mounted within said cylinder;

a piston ring positioned about said piston, said piston ring comprising a top surface connected to an outside surface through a leading edge, said leading edge characterized by an arc having a radius of curvature of less than or equal to about 4 times said height; and

wherein said piston ring is formed of a material comprising about 64 wt% to about 68 wt% cobalt, about 26 wt% to about 30 wt% chromium, about 3.5wt% to about 5.5 wt% tungsten, and about 0.5wt% to about 2 wt% carbon.

43. The gas compressor apparatus of claim 42, wherein said material further comprises silicon, manganese, molybdenum, or a combination thereof, and wherein said material comprises up to about 3 wt% nickel, up to about 3

44. The gas compressor apparatus of claim 42, wherein said gas compressor apparatus is capable of operating at a temperature of up to about 450°F with a compressor inlet at about atmospheric pressure, to produce a compressed gas having a pressure greater than or equal to about 5000 psi at a compressor outlet.

45. A method of sealing a piston at a temperature up to about 450°F at a pressure up to about 5000 psi, comprising:

positioning a piston ring about a piston,

mounting said piston within a cylinder such that said piston ring is sealingly engaged with a wall of said cylinder; said piston ring having:

a gap that is characterized by a gap width that is about 1.4 to about 2.0 times greater than a thickness of said piston ring when said piston ring is installed on said piston;

a height that is about 4.5 to about 6.4 times larger than said thickness;

a top surface connected to an outside surface through a leading edge,

said leading edge characterized by an arc having a radius of curvature of less than or equal to about 4 times said height; and

said piston ring is formed of a material comprising about 64 wt% to about 68 wt% cobalt, about 26 wt% to about 30 wt% chromium, about 3.5 wt% to about 5.5 wt% tungsten, and about 0.5 wt% to about 2 wt% carbon.

46. The method of claim 45, wherein said piston ring has a ductility to allow said piston ring to be installed on said piston, without said piston ring becoming cracked, fractured, or bent into a second shape different from a first shape which characterized said piston ring prior to being installed on said piston.